UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports*
for
SOIL CONSERVATION SERVICE RESEARCH**

MAY 1946

EROSION CONTROL PRACTICES DIVISION

On-Location Educational Use of Research Work - H. B. Atkinson, LaCrosse, Wisconsin.-"During the past month there have been numerous tours of the Station by groups of farmers, county agents, and Soil Conservation Service personnel. There were three tours composed of rural grade school children from a nearby county. These tours were arranged and made possible through the joint efforts of the County Agent, the Soil Conservation Service Work Unit Project Leader, and the County Superintendant of Schools. These tours had a two-fold benefit for it not only gave the children but also their parents an opportunity to observe the work and results of the Station. It was found advantageous to split these groups, taking the children and the parents over the Station in two separate tours. It was then possible to talk directly to the children and get some of the fundamental principles of erosion control across to them.

"A County Agents school was conducted from May 6 to 9. Twenty-seven county agents and assistant county agents from Wisconsin attended this school. Reports from the agents were quite favorable.

"On May 15, a group of eight ministers from Minnesota visited the Station. These men were interested in using conservation information on Rural Life Sunday."

Field Day - Harley A. Daniel, Guthrie, Oklahoma.-"Much of our time during the month was spent in preparing for the annual field days. The field day at Cherokee was May 24. We had a very successful meeting. There were about 500 people present and all of them were greatly interested. Dr. A. W. Young of the Texas Technological College, Lubbock, Texas, was the principal speaker."

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**All Research work of the Soil Conservation Service is in cooperation with the various State Experiment Stations.

Station Visitors in May and June - C. A. Van Doren, Illinois.

Dixon Springs

May 2 - 40 farmers from Illinois and Kentucky.
May 8 - 35, agriculture class, Vienna High School.
May 9 - 25, conservation class, Vienna High School.
June 4 - Harry Gardner, Regional Agronomist, Milwaukee; Austin, Assistant Chief, Agronomy Division, Washington, D. C.; Joseph Pierre, Nursery Division; R. W. Whitsitt, Assistant State Conservationist, Urbana, Illinois; George Fager, District Conservationist, Anna, Illinois.
June 5 - 30 FSA Supervisors, southern Illinois.
June 6 - 25 farmers, Marvin County, Illinois.
June 7 - 38 farmers, Franklin County, Illinois.
June 17 - 150 Farm Advisers, Assistants, and other Extension Agents, Illinois.

Urbana

June 11 - Illinois Seedsmen Association - 150 members.
June 21 - Chicago Farmers - 100 members.
June 26 - Illinois Crop Improvement Association - 125 members.

Stubble Mulch - F. L. Duley, Lincoln, Nebraska.-"Trips made during the month have shown that there is an increased interest among farmers in different parts of the State in the use of residues to protect the soil. Some of the best examples are to be found in the summer fallow areas in the high plains. Here summer fallow with residue on the surface is becoming a common practice in the better wheat growing areas. In some places this is used in combination with wind strip cropping.

"A field demonstration was held near Scottsbluff on May 6 through the cooperation of the County Agent and Soil Conservation District men, where these practices were domonstrated. On May 8 a demonstration of the use of residue in connection with corn production was held on the A. H. Sibbernsen farm in the loess hill country west of Omaha. The District men in central Nebraska are holding a special field day June 18 to demonstrate stubble mulching and other practices in that part of the State."

Stubble Trouble - T. L. Copley, Raleigh, North Carolina.-"The stubble mulch experiment is producing some knotty problems: (1) To begin with, the vetch and rye winter cover on the continuous corn plot was difficult to kill with the subsurface sweep. Even following two trips over with the sweep at about 2-weeks interval, surviving plants almost covered the ground as the corn was coming up. (2) Wire worm damage resulted in not more than a half of a stand of corn on the subsurfaced plots. It was bad following annual lespedeza, and worse following vetch and rye. The turned plots had a much better stand. Corn after the vetch and rye had to be planted over. (3) Grass and weeds in the subtilled plots get ahead of the corn, before it is large enough to be plowed, and is difficult to clean out. (4) Tillage mixes the mulch with the soil too much and speeds up its decomposition.

"These troubles indicate that the bottle neck in the solution of these problems is satisfactory tools for working through surface mulch."

Corn Planter Doubles as Potato Planter - G. R. Free, Marcellus, New York.-"Contour versus up-and-downhill planting of potatoes is being compared at Marcellus this year. We did not have a potato planter in shape to plant the 6 plots of approximately 1/10 acre each with band application of fertilizer, so a 2-row corn planter was provided with: (1) a furrow opener so that the potato pieces could be dropped by hand through a piece of downspout just behind it; (2) two cultivator shovels arranged at each side of the row so that fertilizer from the regular hoppers on the corn planter could be applied in bands, one below the level of the seed piece and one at the same level; and, (3) a pair of discs for covering. This 2-row corn planter, or one-row potato planter, was drawn by a tractor with a man feeding the potato pieces. The man rides backwards on an extra seat bolted to the stick tongue of the planter. The wheel gave the "clicks" for spacing, but it would not be difficult to arrange for a table feed. The job of planting and fertilizer application appeared to be quite satisfactory, but, of course, stands and yields will furnish a better measure of this later."

Seedbed Treatment and Fertilizer Placement for Alfalfa-Brome Seeding - Dwight D. Smith, Columbia, Missouri.-"The first cutting of alfalfa-brome on 4 field trial areas in Clay, Boone and Franklin Counties has been harvested. Two methods of seedbed preparations were used. The average of 8 yields for seedbed preparation by disking alone was 1.31 tons per acre in comparison to 1.26 tons per acre for plowing and disking. The difference is not significant. Average yield of hay from plots with plow sole application of fertilizer did not differ from that where the fertilizer was applied with a drill after plowing. The average yield for May from 6 plots receiving manure (about 9 tons per acre) and phosphate fertilizer yielded 1.41 tons per acre in comparison to 1.16 tons from the plots receiving 800 pounds per acre of 4-12-8 fertilizer. Treatments were applied last spring at time of seeding. Yield relationships for subsequent cuttings are expected to vary from these first cutting results."

Wild Vetch Furnished Winter Grazing and Increased Hay Yield in Meadow - J. B. Pope, Tyler, Texas.-"Little bluestem meadow top-seeded with wild vetch in the fall of 1944 furnished grazing for dairy cattle in 1945-46 during December, January, February, and March. The first cutting of hay was made on May 21. The average yield of air dry hay from areas with wild vetch was 1.96 tons per acre in comparison to check areas without vetch of only .87 ton. A number of other legume combinations increased the hay yield, though wild vetch (Angustifolia) was the only one which furnished winter grazing."

Crimson Clover for Winter Ground Cover - H. L. Borst, Zanesville, Ohio.-"For the second season, a luxuriant growth of crimson clover winter cover crop was plowed under for corn. It looks as though this plant will make an outstanding winter cover and green manure crop for this section."

Reseeding Winter Legumes and Summer Row Crops - E. C. Richardson, Auburn, Alabama.-"In the fall of 1944 plantings of bur clover, Caley peas, and grandiflora vetch, all reseeding winter annuals, were made on the North Auburn farm. Good stands of these cover crops were obtained. When the heavy crop of seeds on these covers were fully matured, in the spring of 1945, the entire growth was turned with a two-horse plow, and followed with grain sorghum. Yields of grain sorghum were about the same, approximately 40 bushels per acre.

"In late summer of 1945, good volunteer stands of Caley peas and vetch developed, while the volunteer stand of bur clover was poor. Green weight yields March 30, 1946, were as follows: vetch, 21,000; Caley peas, 16,000; and bur clover, 5,000 pounds per acre.

"The cover crops were turned immediately after taking yields and the land was later planted to corn. Soon after turning, a thick stand of bur clover came up, supposedly from seed worked to the surface of the turning operation. Only a partial stand of peas and vetch came up.

"The corn looks very promising. If satisfactory volunteer stands of the cover crops are obtained following the corn, a portion of each area, or the entire area, will again be allowed to mature seed and will be followed by grain sorghum in 1947."

Soil Moisture Conditions on Grass Land - C. J. Whitfield, Amarillo, Texas.-"Grasses made almost no growth during the month and started to cure. Weeping lovegrass stayed green somewhat longer than the native grasses. This is thought partly due to better soil moisture on this pasture. A rain of from .62 to .91 inch on the station on May 28 caused all grasses to show a small amount of green by the end of the month. The poor moisture condition on grass land is shown in the following table:"

Available Moisture - May 31, 1946

Type of Pasture	Depth Sampled				Total
	0-6"	6-12"	12-24"	24-36"	Upper 3 ft.
	(Inches of Available Moisture)				
Native blue grama-buffalo Moderately grazed	.27	.12	.33	.31	1.03
Native blue grama-buffalo Heavily grazed	.27	.10	.21	.29	.87
Mixture - Reseeded warm and cool season grasses	.07	.20	.28	.14	.69
Western wheatgrass	.22	.17	.31	.11	.81
Weeping lovegrass	.31	.23	.59	.43	1.56
Crested wheatgrass	.19	.17	.41	.34	1.11

Deep Plowing in Relation to Soil and Water Loss - Harold T. Barr, Baton Rouge, Louisiana.-"The total rainfall for May was 12.89 inches as compared to a 40 year average for the month of May of 5.25 inches. However, there were no periods of abnormally high intensity.

"The soil loss varied from 606 pounds to 3673 pounds per acre on the individual plots and water loss varies from 1.49 to 7.55 inches per acre. Lowest losses of both soil and water was on land plowed 12" to 14" deep following a winter cover crop. Highest losses of both soil and water was on land plowed 5" deep and no cover crop. At the time of the heaviest May rains, cotton was just coming up."

The Use of the Calkins Rotary Subsoiler on Dry Farms - Hugh C. McKay, Idaho.-"This spring a survey was made in cooperation with the District Conservationist of the Idaho Falls Work Group of the results of application of conservation measures on dry farms in that area. The use of the Calkins rotary subsoiler was the principal practice studied.

"The new type of machine with straight teeth where used late in the season on Jess Hays farm did not increase moisture storage or prevent erosion. The older type of machine with curved teeth used on the Petersen farm gave good results by increasing moisture storage and preventing erosion. The percent moisture to a six foot depth was as follows:

	Untreated Stubble Land	Subsoiled Stubble Land
1st foot	18.8	19.8
2nd foot	17.5	18.0
3rd foot	20.1	20.4
4th foot	19.9	22.4
5th foot	17.0	22.7
6th foot	16.6	23.1
Average	18.3	21.1

"The main advantage in moisture came in the 4th, 5th and 6th feet. The advantage shown by this subsoiler was due to the curved teeth leaving a much rougher open surface condition."

Most Severe Erosion Occurs from April to July - C. A. Van Doren, Urbana, Illinois.-"Soil loss records at Urbana indicate that from two to three storms each year, occurring during the period April through July, are responsible for 70 percent of the yearly soil loss.

"One of the more severe storms of this type occurred on the night of June 19 when 2.24 inches of rain fell within 2.4 hours. This storm, according to Yarnell intensity-frequency data, would classify as a five year frequency

on the basis of the 30 minute intensity, and a ten-year frequency on the basis of the 60 minute intensity. Soil and water losses were high on the two percent slope plots. Losses by plots are as follows:

	Inches of Water Lost	Percent Water Loss	Tons Soil Lost Per Acre
Contour Corn	1.40	62.5	2.6
Up & Down Corn	1.36	60.7	3.0
Up & Down Soybeans	1.76	78.6	2.1
Contour Soybeans	0.90	40.2	0.7

"A maximum rate of run-off of 0.9 cubic feet per second occurred on the up-and-down-hill corn plot."

Algae and Molds on Desert Soils - Joel E. Fletcher, Tucson, Arizona.- "Dr. W. P. Martin, formerly of this station and the University of Arizona is to present a paper 'Some Effects of Algae and Molds on the Rain-Crust of Desert Soils' to the western section of the American Ecological Society. It will be shown that the presence of the microflora increases the permeability, while carbon content increases up to 300% and nitrogen up to 400% of the original soil."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic Studies - L. L. Harrold, North Appalachian Experimental Watershed, Coshocton, Ohio.-"The rainfall for the month totaled 5.53 inches - rain falling on 18 days well distributed throughout the month. Runoff and soil loss for the month from the wheat and corn watersheds is given in the following table:

Watershed No.	Area	Land use 1/	Runoff	Erosion
	Acres		Inches	Lbs. per acre
103	0.65	Corn - I	T	0
110	1.27	Corn - P	T	0
185	6.87	Corn-grass strips - I	.02	1
192	7.86	Corn - P	.14	86
123	1.37	Wheat - I	T	0
115	1.61	Wheat - P	.03	1

1/ I = Improved land use with contour cultivation.
P = Prevailing land use with straight-row cultivation.

"The corn watersheds by May 25 had been plowed, worked down and planted. Practically all of this runoff and erosion occurred on May 25 and 27 when 0.47 and 0.95 inches of rain fell. Maximum 5-minute rainfall rates for the former storm reached 4.2 inches per hour. The peak runoff rate for watershed No. 192 amounted to 0.09 inch per hour. Rainfall rates and runoff peaks for other storms and other watersheds were greatly less than these. The storm of May 27 produced a peak rate of runoff of 0.03 inch per hour - one-third of that of May 25; yet the total storm flow amounted to 0.10 inch - five times that of May 25. The storm rainfall of 0.95 inch fell at less rates than that of May 25.

"With the high rainfall amounts and the low runoff totals, there were over 5 inches of water taken up by the soil as infiltration. Records from the two ground-water observation wells now in operation indicated that the field capacity of the soil profiles was exceeded. On May 20, about 3/4 inch of rainfall infiltrated the soil. The rise of the water table started 30 to 40 minutes after beginning of rainfall - the total amount of the rise was somewhere between 0.5 and 0.8 feet. This is, roughly, 12 times the amount of rainfall.

"Again in the rain period, May 25 - 27, a rise in the water table of 1-1/2 feet was recorded. The infiltration in this same period totaled 1.5 to 1.7 inches.

"The ground-water wells were closely associated with wooded areas. Percolation through such soil profile (Watershed 131) is expected to be more rapid and more responsive to infiltration than that in cultivated (No. 109) or pasture (No. 104) areas. Percolation records for the cultivated lysimeters showed no reaction from the May rains. Similar records from the pasture lysimeter showed only a slight increase in the period, May 23 - 29. Soils data show that the field capacity of the 40-inch profile averages higher in the cultivated watershed, less in the pasture watershed, and still less in the wooded watershed."

Hydrologic Studies - J. A. Allis, Central Great Plains Experimental Watershed, Hastings, Nebraska.-"Rain was recorded 15 days of this month at the meteorological station totaling 2.94 inches, and the largest rain was 0.70 inch. These were very timely rains and added materially to the crop conditions. However, the dry weather in April stunted the growth of the small grain crops and the yields of wheat especially will be low. In the vicinity northeast of Hastings, as much as 4 inches of rain was observed on May 23. Other heavy rains were reported in spotted areas during the month.

"On May 2, 7 and 11 frost was observed at the meteorological station; the minimum temperature of 27.7 degrees on May 11 damaged fruit trees, potatoes and gardens, but apparently did very little damage to the crops generally.

"It is contemplated that a publication will be prepared on 'Rates and Runoff for Design of Conservation Practices' which will be applicable to areas in this region. Records at Hays, Kansas, and Finney Lake, Kansas, will be utilized to supplement the Hastings records."

Hydrologic Studies - R. G. White, East Lansing, Michigan.-"For the month of May, precipitation measured 3.98 inches at the cultivated watersheds, 3.97 inches at the wooded watershed, and 3.96 inches at the stubble-mulch plots, as measured by the Standard U. S. Weather Bureau type non-recording raingage. The 40-year average for East Lansing is 3.44 inches. The extremely dry weather of late March and April continued until mid-May, with all May rainfall, except approximately 0.30 inch, falling after May 14th. There was no runoff during the month, and no soil erosion.

"Throughout the dry period, the soil-moisture content at Watershed 'A' (plowed for corn) did not drop below the 10 to 12 percent moisture range down to a depth of 60 inches. However, at Watershed 'B' (brome-alfalfa sod) the soil-moisture content dropped below the wilting point for the surface 9 inches, and ranged from the wilting point up to approximately 10 percent at depths from 9 inches to 60 inches."

Hydrologic Studies - John Lamb, Jr., Ithaca, New York.-"May was a very wet month. Rain fell on 14 days with a total average for all watersheds of 7.99 inches for the month; this being the highest station precipitation for the past 11 years. The accumulated precipitation, January through May, however, was 0.54 inch below a 10 year average. With the exception of the May 25 thundershower, following a maximum temperature of 82 degrees F, all storms were of moderate intensity. The storm causing the peak runoffs, as given below, began approximately at 6:00 P.M. on the 26th and continued until noon May 28, 42 hours with an average total of 4 inches. This was the storm that caused so much flood damage to Painted Post, Corning, Big Flats, and Elmira - all located on or near the Chemung River in Steuben and Chemung Counties."

May data

	Watersheds				
	#1 Idle land	#2 Idle land	#3 Idle land	#4 Wood-land	#5 Wood-land
Maximum temperature.....	82	-	-	84	-
Minimum temperature.....	27	-	-	27	-
Average mean temperature.....	53	-	-	53	-
Precipitation, inches.....	7.67	7.91	7.91	8.16	8.21
Peak flow, inches per hour....	.166	.193	.214	.133	.130

Hydrologic Studies - R. W. Baird, Waco, Texas.-"Fifteen days of May had measurable amounts of rainfall. The total rainfall for the month was 9.02 inches at the project headquarters gage. This is about twice as much as the mean for Waco. The maximum monthly rainfall for May 1944 at the project was 12.55 inches. In spite of the large amount of rain, only one storm of May 12-13 caused high rates of runoff.

"A paper entitled 'The Effect of Conservation Practices on Peak Rates of Runoff' was presented to the Texas Section of the American Society of Civil Engineers at Waco on May 10. Data for 7 years for the 170-acre untreated area 'W-1' and the 130-acre area 'Y-2' were presented. The 'Y-2' area was untreated for the period 1939 to 1942 but during the fall of 1942 conservation practices were established. During the period 1939-1942 when both areas were untreated, there were 15 storms causing runoff rates greater than 0.5 inch per hour at station W-1 and 23 storms causing runoff rates greater than 0.5 inch per hour during the second period, 1943-1945.

"From an analysis of this data, conservation practices have reduced the peak rates of runoff about 0.4 inch per hour, but there is a tendency for the reduction to be less for the extreme storms.

"Some data for the storm of May 12-13, 1946 are given below:

Area	Size	Rainfall rate for time of concentration	Peak rate of runoff	Total Rainfall	Total Runoff
	Acres	Inches per hour	Ins. per hr.	Inches	Inches
W-1	170	2.71	2.15	3.75	2.91
Y-2	130	2.74	1.56	3.37	2.76

"Using the method of estimating the peak rate of runoff as developed in the paper mentioned above, the computed peak rate of runoff from 'Y-2' would have been 1.76 inches per hour if the rainfall had been the same as that on the 'W-1' area. Actually the 'W-1' area had appreciably more rainfall."

Runoff Studies - V. D. Young, Fayetteville, Arkansas.-"The rainfall on the Bentonville, Ark. watersheds for the month of May varied from 9.57 inches to 11.1 inches with a mean of 10.24 inches. This mean is 1.95 times the Bentonville normal as recorded by the Weather Bureau. There were 14 days during the month during which precipitation occurred on the watersheds. The heaviest precipitation occurred during the evening of the 24th following a 0.63 inch rain which ended about 8 hours previous. A 1.27 inch rain occurred the day previous.

"This rain during the evening of the 24th produced high rates of runoff and the total water retained was low. These data are given on page 11. From these data it will be noted that two watersheds, namely W-IV, a wooded area, and W-VI, a terraced meadow area, had over 100 percent runoff. In the case of W-IV, this was undoubtedly due to stored ground water and seepage flow from previous rains. In the case of W-VI, the flow was 0.068 c.f.s. at the time the runoff began due to the afternoon rain. According to a classification of rains as shown in U.S.D.A. Miscellaneous Publication No. 204 by Yarnell, this storm has a recurrence interval of from 2 to 5 years.

"The mean precipitation for the month of May on the Muskogee, Okla. stations was 8.31 inches. This was 1.72 times the normal for Muskogee as recorded by the Weather Bureau.

"The precipitation-runoff relationship for the Muskogee watersheds for the period April 29th through May 23rd together with the maximum rainfall for selected time intervals, total precipitation for the period, and the maximum peak rate of runoff which occurred are given on page 12. From these data it will be noted that from 45 to 64 percent of the precipitation was lost as runoff from the watersheds. The highest peak rate occurred from an alfalfa area which was plowed and planted to corn in the spring of 1946. The next highest rate occurred from a closely grazed pasture area and the lowest rate from a pasture and meadow area

Table 1--Bentonville, Arkansas Precipitation - Runoff
May 29, 1946

Watershed	Storm total inches	Precipitation Inches - maximum for selected time intervals: 5 Min.	10 Min.	15 Min.	20 Min.	30 Min.	Max. peak rate ins/hr.	Runoff Inches	Runoff percent of rainfall	Cover and Tillage
W-I (Sears)	2.89	0.36	0.62	0.74	0.96	1.29	2.1061	2.695	93.2	Good cover of small grain about 12" tall.
W-II (Henderson)	2.77	.32	.66	.94	1.16	1.54	1.8475	.2076	7.49	Very good cover-No pasturing of area. Hop clover and lespedeza 4-6" tall. Grasses 12" tall -weeds 18 - 24".
W-III (Henderson)	2.87	.37	.72	1.03	1.32	1.69	1.5451	.1246	4.34	Same as W-II except that upper half of watershed in small grain about 12" tall.
W-IV (Greer)	3.27	.35	.70	.91	1.11	1.52	1.6321	3.4104	104.3	Wooded - Very good canopy. Ground covered with thick leaf cover.
W-V (Mayfield)	3.14	.34	.60	.85	1.01	1.40	1.774	1.8886	60.14	Small grain about 12" tall. Heavy cover of grassed turned under in Feb. 18% of area in clean cultivated corn.
W-VI (Rife)	2.26	.30	.55	.73	.97	1.21	.922	2.407	106.5	Meadow - Clover and grasses 8-10" tall. 1.02" rain ended 10 hours previous.

Table 2.--Muskogee, Oklahoma Precipitation - Runoff
April 29 to May 23, Inc., 1946

Watershed	Precipitation						Runoff			Cover and Tillage
	Rainfall	Inches - maximum for selected time intervals: 5 Min.	10 Min.	15 Min.	20 Min.	30 Min.	Max. peak runoff	Rate Ins/hr.	Runoff percent of Rainfall	
	Inches						Inches			
W-I (Stebbins)	9.13	0.36	0.62	0.75	0.77	0.82	4.5425	2.7992	49.75	Corn planted across slope about 10" tall. Last cultivation approx. 4-24-46
W-II (Stone)	10.09	.65	1.18	1.45	1.54	1.60	4.5516	1.7623	45.11	Land north of drainage channel plowed in March and kept fallow. Land south of channel in weeds. Grasses about 3" tall.
W-III (Reid)	9.39	.36	.74	1.00	1.17	1.35	6.0593	2.2831	64.53	Good stand of lespedeza but short. Approx. 15 head of cattle being pastured.
W-IV (Trumbo)	8.41	.17	.37	.42	.45	.47	4.4345	.5224	52.73	Hay meadow and pasture. Meadow about 12" tall 4-30-46.

which had a fair growth of grasses. There was considerable variation in the intensity of the storm between watersheds and undoubtedly accounted for some of the differences in peak rates."

Runoff Studies - N. E. Minshall, Madison, Wisconsin.-"As compared with a normal of 4.2 inches, precipitation for Edwardsville for the month was 5.45 inches. Although this precipitation was well distributed and all intensities moderate, yet the runoff from the 50-acre pastured watershed was 1.5 inches.

"Precipitation for Fennimore was 1.81 inches, which was quite well distributed during the first 3 weeks of the month. The intensities and amounts in individual rains were very low so most of the precipitation was probably evaporated from the surface of the soil or plants, and thus very little benefit was derived from it. The total precipitation for the year through May 31 was 8.0 inches as compared to the normal of 11.0 inches. The total April and May precipitation amounted to 2.78 inches with a normal for this period of 7.0 inches. The winter snows and March rainfall were of little or no value since nearly 100 percent of this precipitation appeared as surface runoff due to the frozen soil. The small grain looks exceptionally good even though the moisture has been low. The pastures are beginning to show the effects of lack of precipitation, and some of the vegetation is already brown and dormant."

Runoff Studies - T. W. Edminster, Blacksburg, Virginia.-"A considerable amount of time was spent on the analysis of data for the Ridges and Valleys Report. Pondage correction tables were prepared for the Tazewell Watersheds W-I and W-II and also for Wise, and Terpstra W-I. Investigations of the T.V.A. records showed that no final drawings were prepared for the remaining pasture watersheds. Consequently, it was impossible to prepare pondage correction tables for those areas. The size factor analysis was applied to the data from W-II and W-III at Blacksburg and the resulting tables of values ranging from 2 to 100 acres on a 25-year expectancy basis. An attempt has been made to apply this same treatment to the Tazewell data, but to date, this has been unsuccessful. Some time was also spent in studying the rainfall data on the remaining watersheds in an effort to select prepared runoffs for further size factor analyses."

Hydraulic Studies - F. W. Blaisdell, Minneapolis, Minnesota.-"Mr. Anderson made twenty-two additional tests of the 1-1/8-inch diameter model of a pipe drop inlet spillway. The data for these tests was recorded photographically. They indicate that possibly the 1-1/8-inch diameter model was too small to be reliable. The tests were made on this small model to discover these scale effects. Observations show that the nappe clings to the side of the riser of the small model and it does not for the larger (4-1/2-inch diameter) model."

Hydraulic Studies - V. J. Palmer, Stillwater, Oklahoma.-"The construction of the last gate structure for the large field channels in Block A was started. Channels FC1 and FC2, lined with a grass mixture and weeping lovegrass, respectively, will be ready for testing in the fall. To eliminate possible damage from stock, a fence was constructed around the Block B unit channels.

"Satisfactory progress was made in the preparation of the Handbook of Channel Design. At a conference in Fort Worth May 15, final decisions as to text, tables, and diagrams were made. The most important items in this handbook are:

(a) A table of permissible velocities for channels lined with vegetation. Permissible velocities vary not only with vegetation, but also with slope and erodibility of the soil.

(b) A nomograph solving Manning's formula. This graphical solution is adaptable to channels where Manning's n can be considered constant; for example, hard surfaced channels and most drainage channels.

(c) Diagrams for rapid solution of the dimensions of trapezoidal, triangular, and parabolic channels. For the parabolic channels a nomograph has been prepared that permits the graphical determination of widths for other depths than the capacity depth and side slopes (of the tangent) at any depth.

(d) From research results at Spartanburg, S. C. and Stillwater, Okla. it has been possible to select four relationships of Manning's n to VR (product of mean velocity and hydraulic radius) that represent different degrees of vegetal retardance. Length of cover largely determines the degree of retardance to use.

(e) To apply the relationships indicated in (d), diagrams have been prepared that solve graphically the Manning formula keeping VR compatible with n. If the selected diagram is entered with V, the required $\bar{R}$ is determined. Then the charts described in (c) are used to complete the solution."

Hydraulic Studies - A. W. Marsh, Corvallis, Oregon.-"At the Malheur Station the grass plots on the non-saline trials were given a pre-irrigation, following which the grass mixture was seeded. Weirs, checks and control boxes were then installed on all 48 plots. A wood V-shaped flume was constructed to carry water to the second range.

"On May 23 the first general irrigation was started. The data have not been analyzed but observation showed plainly that the manured plots absorbed water much more rapidly, required a larger inflow stream, took longer for the water to reach the lower end of the plots, and then provided less runoff and silt transport.

"There was a striking visual contrast between the 12 inch and 24 inch corrugation spacings. In a relatively few hours the moisture had 'subbed across', as the term is locally used, between the 12 inch corrugations while days are usually required for this with 24 inch corrugations. Having twice as many corrugations permits almost doubling the head used per plot and the irrigation can be completed before the lowest part of the time-infiltration rate curve is approached."

Hydraulic Studies - Stephen J. Mech, Prosser, Washington.-"The month was one of considerable activity. Plot irrigations and hay cutting were the principle jobs. A total of 40 plot-irrigation were made and complete data obtained. Unfortunately the quality of the records obtained may be reduced somewhat by the greater than usual number of pump shut-downs. The spring cutting of vegetation in and along the main canal made it necessary to clean the pump more often than usual.

"Another interruption occurred on May 4 when waste water from the new Roza land got out of control and filled up our supply canal with silt. Service was restored two days later after the silt was shoveled out.

"The first cutting of hay was made on all plots on May 23 and 24. Green weights were taken and will be converted to hay yield on air-dry basis."

Hydraulic Studies - Vito A. Vanoni, California Institute of Technology, Pasadena, California.-"A preliminary report was prepared covering the tests of a 1:50 scale model of the Rock Eagle Lake Spillway.

"Tests were continued on a 1:50 scale model of Lake Coffee Mill Spillway Plan V. This spillway has a crest 160 feet long, which is circular in plan, and the chute contracts to 80 feet in width by means of walls which are also circular in plan. The chute has a slope of 10 percent and the structure is designed to discharge a maximum of 15,550 cfs. Previous experiments indicated that with a flat floor, as proposed in the design, some waves occurred in the chute, which modified the flow distribution, causing it to be non-uniform at the entrance to the stilling basin. A series of tests were made in which the floor was covered in varying amounts in an attempt to eliminate these disturbances and to make the flow uniformly distributed at the stilling basin. These were unsuccessful and the best condition is still obtained with the flat floor. This series of tests has indicated that a further analytical study of the problem is required before a satisfactory solution can be obtained."

Sedimentation Studies - Carl B. Brown, Washington, D. C.-"In the project for investigation of reservoir silting in the Central Valley Area, Calif., an inspection was made of the Crane Valley Reservoir, and previous survey data were recomputed. Final computations were made for rates of silting in Bullards Bar and Exchequer Reservoirs. Watershed mapping was underway in the American River area. At the end of the month most of the northern half had been completed, and work was proceeding on the South Fork. Snow drifts still block many of the roads above 6,500 feet elevation.

"A resurvey was begun on Lake Decatur at Decatur, Illinois, as a cooperative undertaking of the Illinois State Water Survey, the Illinois Agricultural Experiment Station, the Upper Sangamon Valley Conservation Service, which is financed by the City of Decatur, and the Soil Conservation Service. At the end of the month most of the 49 ranges across the lake had been resurveyed. The field work is scheduled for completion by June 15.

"A paper entitled 'Erosion Control on Watershed Lands' was delivered by Mr. Brown at the annual convention of the American Waterworks Association in St. Louis on May 9. A paper on 'Reservoir Silting in Stock Ponds of the Pierre L. U. Project, South Dakota', was delivered by Mr. Gottschalk at the meeting of the American Geophysical Union in Washington on May 29."

Sediment Studies - Vito A. Vanoni, Cooperative Laboratory, California Institute of Technology, Pasadena, California.-"The manuscript by Hugh Stevens Bell entitled 'Thermal Density Currents in Shaver Lake' was reviewed and modified in accordance with suggestions made by the reviewers. This manuscript is intended for publication in the Transactions of the American Geophysical Union."

Drainage Studies - R. E. Morris, North Liberty, Indiana.- "Dr. G. N. Hoffer of the American Potash Institute has derived a method of determining the effectiveness of land drainage on a given field by means of a simple chemical test. The test in itself is nothing more than an application of the standard tests for ferrous and ferric iron, and the chemical reactions involved may be found in any standard text of inorganic chemistry. The test is made as follows:

"A soil sample is treated with dilute hydrochloric acid and then with potassium ferricyanide ($K_3Fe(CN)_6$). A blue coloring indicates the presence of ferrous or reduced iron. This, in turn, indicates inadequate aeration of the soil at the depth which the sample was taken. To test for ferric iron, a sample is treated first with hydrochloric acid and then with potassium thiocyanate. A red coloring indicates the presence of ferric or oxidized iron and that drainage and aeration is adequate.

"An extensive utilization of these tests is contemplated as a means of further investigating the effect of controlled drainage on the muck soils. Also, we plan to use it in checking the efficiency of drainage systems on farms in this area."

Drainage Studies - James Turnbull, Lake Alfred, Florida.-"During the month the remaining fruit on the irrigation plots was picked and the yield recorded. The grapefruit yields this year in the irrigated plots were considerably higher than the yields in the check plot. However there appears to be no correlation between the quantity of water applied by irrigation and the yield of grapefruit. The irrigated grapefruit matured much earlier than the unirrigated grapefruit. The experimental plots in oranges failed to show any increased yield due to irrigation. Observation of a number of irrigation systems in operation

reveals that they distribute the water poorly and that very little water gets under the trees. It was noted that the soil, even the so-called 'wettable' sand does not absorb very much of the irrigation water applied, except in a few low spots in the middles where 'funnels' form. Even after 3-1/2 inches of irrigation water had been applied dry sand was found within an inch of the surface both in the middles and under the trees. Only in the low spots in the middles was the sand wet more than this. Apparently the water ran off through the 'wettable' funnels as quickly as it was applied. A slower rate of application which would prevent any surface runoff to the low spots seems desirable. Distribution which will reach under the trees and apply the water in finer drops is also needed. A new sprinkler head has been developed in cooperation with the Experiment Station and preliminary tests appear promising."

Drainage Studies - M. H. Gallatin, Homestead, Florida.-"As indicated in last month's summary, water tables dropped in the lower part of the area to minus elevations. If this lack of rainfall had continued, water tables through the lower part of the area would have dropped below mean sea level.

"During the early part of the month it started raining throughout the area and while the rains have not been general the ground-water table has begun to rebuild. The following data will give some idea of the spotty occurrence of the rains for this area:

Mowry and Red Roads	17.25
Sub-Tropical Experiment Station	13.15
Coconut Palm and Naranja Roads	12.27

"From the following data it will be seen that the lower part of the area received more rain than the middle and northern part of the area:

Well No.	Elev.Ft.M.S.L. 4/30/46	Elev.Ft.M.S.L. 5/20/46	Increase in Elevation
1	0.09	2.05	1.96
2	.14	2.26	2.12
3	.04	2.30	2.26
4	.32	2.66	2.34
5	.41	2.81	2.40
6	.44	2.95	2.51
7	1.08	5.21	4.13
8	.85	3.24	2.39
9	1.06	3.44	2.38
10	1.31	3.50	2.19
11	1.51	3.46	1.95
12	1.95	3.78	1.83
13	2.38	4.00	1.62
14	2.35	4.03	1.68
15	2.50	4.08	1.58
16	2.41	3.79	1.38
17	2.08	3.52	1.44
18	2.15	3.21	1.10
19	2.08	3.13	1.05
20	7.51	8.58	1.07
21	1.79	2.85	1.05
22	2.31	3.40	1.09
23	1.27	2.41	1.14
24	1.55	2.73	1.17
25	1.62	2.79	1.17
26	.82	3.84	3.02
27	.66	3.53	2.87
28	.62	3.39	2.77
29	.40	3.03	2.63
30	.38	2.64	2.26
31	.32	2.35	2.03
G2B	2.46	3.77	1.31
E32	.29	2.07	1.78
Meas. Point	2.80	3.99	1.19
E 33	.19	1.91	2.10

"It will be noted that the greatest rise in water table was in the wells in the southern part of the area. To get data on the fluctuation of the rainfall for this area we have put out three standard rain gages during the month in cooperation with local growers. One, west of the intersection of Redland road and Gossmer Drive; two, on Eureka Drive about 500 feet west of well No. 18; three, at the corner of Roberts Road and Avacado Drive. Also, a recording gage was put in the Silver Palm Drive and Formlife Road area. As soon as the measuring sticks arrive we plan on putting out several more.

"During the past month we have started sampling Snake Creek Canal and Biscayne Canal areas in north Miami. This area was sampled on May 9. Chlorides were quite low over most of this area. This was probably due to heavy rains which had fallen the first of the month.

"Samples taken along the Tamiami Canal in northwest Miami indicate that while the rains have leached out part of the chlorides they still are quite high.

"The following are the results of three samplings to date, from the Tamiami Canal area, northwest Maimi:"

Location Point	P.P.M. Chlorides March 26, 1946	P.P.M. Chlorides April 26, 1946	P.P.M. Chlorides May 23, 1946
18	1144.0	1096.0	1021.0
14	3275.0	1976.0	2164.0
23	116.0	1008.0	726.0
4	1534.0	3069.0	2151.0
20	1570.0	2443.0	350.0
1	12626.0	8260.0	7665.0
25	3315.0	2646.0	2121.0
10	3150.0	493.0	722.0
19	109.0	1112.0	70.5
12	210.0	167.0	95.0
13	38090.0	4664.0	1318.0
11	50702.0	32256.0	5947.0
17	15682.0	16650.0	8107.0
7	7980.0	16378.0	3072.0
3	75.0	102.0	108.0
21	10105.0	9392.0	3328.0
15	85255.0	53305.0	29645.0
9	7630.0	1656.0	363.0

Drainage Studies - T. W. Edminster, Blacksburg, Virginia.-"The installation of draw-down curve pumping equipment was completed early in the month and a rod actuated automatic switch was tried out. This was observed to be unfit and upon the suggested design of Mr. J. R. Price, a float actuated switch was installed which has proved most satisfactory during subsequent trials. During a course of about three weeks 27 runs were completed on the basis of twice a day measurement of the observation wells. The results have been unusually gratifying in that the draw-down curves so plotted have been consistent. One 24 hour run was completed on May 27-28. During this run half-hour and hourly readings were taken to determine more closely the rates and trends in the draw down."

IRRIGATION DIVISION

Water Requirements for Irrigation - Salinas Valley, Calif.- A report on "Irrigation Practices and Consumptive Use of Water in Salinas Valley, California" by Harry F. Blaney and Paul A. Ewing was completed. It is planned to make this report available for limited distribution, in mimeographed form, as soon as possible, as it represents an example of the practical application of research results to specific situations.

Evaporation, Transpiration and Seepage Losses Affecting Irrigation - Escondido Valley, Calif.-Dean C. Muckel reports preliminary work in Escondido Valley preparatory to starting an investigation to determine the net safe yield of the ground-water sources. Arrangements were made to have a weir installed in Escondido Canyon so as to measure the summer outflow from the Valley. Arranagements were also made to have a shallow well put down at a selected location to determine the diurnal fluctuation of the water table. Well logs, precipitation and evaporation records were collected. By overlapping records it was possible to obtain a continuous record of precipitation from 1887-88 to date. During the past 5 years the 10-year average has been approximately 125 percent of the long-time average.

Evaporation from water surfaces.-A. A. Young reports that study of evaporation records throughout California produces some items that are closely related to the irrigation requirements of the State. About 200 evaporation records have been tabulated in preparation of a report on evaporation in California, the greater number being obtained in those areas where water is scarce and crops cannot be produced without irrigation. The fewest records are found in areas of considerable rainfall where water for irrigation is available from natural streams or in humid coastal regions where irrigation requirements are lower than in the interior regions.

The necessity for storage of water for irrigation and the requirements of carry-over from year to year has resulted in evaporation measurements from both floating and land pans. Records have been obtained from more than 30 pans floating in reservoirs throughout the State. Of the land pans the popular type is the Weather Bureau pan. About 45 weather Bureau pan records have been tabulated. Many measurements have been discontinued but there are also many long records for continuous periods of 15 to 20 years. The Bureau of Plant Industry pan has the longest continuous records in the State - 32 years at the Biggs Rice Station in the north and 35 years at the U. S. Yuma Field Station in the south.

California appears to have a greater number of evaporation records available than any other State and Los Angeles County has more than any other county in the State. The Los Angeles County Flood Control District maintains about 25 ground pans which are being conditioned for conversion to the screened pan developed by the Division of Irrigation.

Snow Surveys and Water-Supply Forecasts.-R. A. Work reports the preparation of a paper on "Forecasting Streamflow for Irrigation", for presentation at the July meeting of the American Society of Civil Engineers in Spokane. The paper reviews the history of the snow surveys and discusses the methods by which their results are translated into runoff calculations.

Irrigation and Drainage in San Joaquin Valley, Calif.-Paul A. Ewing notes the completion of his report on Irrigation and Drainage in San Joaquin Valley, California. This is an assemblage and re-issue of four papers on water requirements of crops, cost of water, quality of water, and the status of drainage, representing chapters originally submitted to the Bureau of Agricultural Economics for use in the administrative report on San Joaquin Valley, made by that agency to the War Department in 1944. Because the B.A.E. report had a limited circulation, it was felt that the four chapters should be made available to S.C.S. personnel interested in the problems of San Joaquin Valley. The present assemblage has been mimeographed and will be available for distribution when approved in Washington.

Water-Right Doctrines, Region 7.-A statement entitled "Water-right Doctrines, Region 7, S.C.S." was completed by Wells A. Hutchins. This was prepared at the request of D. A. Williams, Chief, Regional Conservation Division, S.C.S., Portland, Oregon, for the use of Operations personnel. The statement as submitted is 20 pages in length. It contains an introductory portion defining a water right, classifying the natural water supplies to which rights of use attach, and discussing generally the water-right doctrines prevalent in Region 7 and their application. This is followed by a separage discussion for each of the States in Region 7 - California, Idaho, Nevada, Oregon, and Washington. For each of these States there is a brief statement of the prevailing water-right doctrines, appropriation of water, determination of water rights, and distribution of water to holders of rights.

Repayment of Irrigation Construction Costs.-A memorandum concerning the operation of joint liability versus individual liability for repayment of irrigation-construction costs was prepared by Wells A. Hutchins. This came about as the result of a memorandum to J. C. Dykes from A. E. McClymonds, Regional Conservator, S.C.S., Lincoln, Nebraska, asking for a study of such procedures and a recommendation of a type of contract to be used on Water Conservation and Utilization Projects.